



Lower Redwood Creek herd – February 2004
Photo by RNSP staff

2004 HERD UNIT CLASSIFICATION OF ROOSEVELT ELK IN REDWOOD NATIONAL AND STATE PARKS (RNSP)

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INTRODUCTION

Historically, Roosevelt elk (*Cervus elaphus roosevelti*) were endemic to the redwood forest ecosystem in northwestern California. Prior to settlement by early American citizens in the 1850's, Roosevelt elk were hunted by the Native Americans, with presumably minimal impact to the elk population. In addition, the Chilula burned the prairies of the Bald Hills regularly, probably in order to make food and plant material gathering easier for the tribe, and promote grass growth to attract wildlife (i.e., elk and deer). However, from 1848 to 1855 market hunting for elk hide and meat to supply gold miners during the northern California gold rush significantly reduced elk populations and distribution (USDI 1983). When the gold rush was over, settlement began and a great deal of elk habitat was burned or logged and converted for ranching cattle and sheep, and crop land use.

The only Roosevelt elk populations that persisted through this period were those occupying coastal lowlands in the northern part of California, where dense forests and brush fields provided protective cover. Mandel and Kitchen (1979) estimated the elk population to be 1,000 to 1,300, with roughly half being located in and around

Redwood National and State Parks (RNSP or “park”). RNSP’s long-term goal for resource management is to restore and maintain the park's natural ecosystem as it would have evolved without modern human technology. This includes restoring elk herds to pre-settlement numbers and distribution and maintaining the population in equilibrium with the environment, regulated by habitat, predation, inter- and intra-specific competition and natural events.

Annual classification data of Roosevelt elk in Redwood National and State Parks has been undertaken since 1996 (Wallen 1997), in an attempt to document relative abundance and simple population characteristics, such as recruitment and calf survival within known herds. While long term monitoring such as this helps managers understand basic elk population dynamics within the park, it is not intended to replace more detailed investigations and research of the Roosevelt elk population within the park.

METHODS

During 2004, most of the elk classification counts during the spring and summer months (March-August) were conducted opportunistically by the Fish and Wildlife Branch staff while performing field surveys for other species. Field visits to herd areas from October through December were generally scheduled bi-weekly for classification counts, however some counts were made opportunistically while doing other field work. The elk classification counts were concentrated on 7 identified herd units (see below). Classification counts were performed by driving or hiking to the identified herd units, and also surveying historic and suspected areas where elk have congregated throughout the park. Using binoculars and spotting scopes, observers reported the total number of elk observed, and also the total number of elk within each classification group (see below). The observers also assigned an observation ranking criteria value to the classification count, identifying the observer’s confidence in the count data (see below). Other RNSP staff and visitors also opportunistically reported elk counts at known herd units, and elk sightings in lesser or unknown elk use areas.

Herd Units

- (1) **South Operations Center (SOC)** herd
- (2) **Lower Redwood Creek** herd
- (3) **Bald Hills** herd(s); (dispersed, several discrete herds)
- (4) **Davison Ranch/Berry Glen** herd (considered the same herds)
- (5) **Elk Prairie/101 Bypass** herd (considered the same herds)
- (6) **Gold Bluffs Beach** herd(s); (dispersed, several discrete herds)
- (7) **Crescent Beach Education Center (CBEC)** herd

Classification Groups

- **Cows** = all females >1 year old.
- **Calves** = young of the year (<1 year old; recognized early by spotted coat and small size; later the spots disappear, but they retain a short, rounded snout.)

- **Spikes** = year old males exhibiting only a main beam, brow tine absent.
- **Mature bulls** = ≥ 2 years, with brow tine evident off the main beam.

Observation Ranking Criteria

- 1 = Good**, visibility good and animals close enough to observe with high confidence accuracy.
- 2 = Fair**, animals are either distant or not fully cooperative for good confidence in classification (e.g. observation time is reduced due to movement into cover).
- 3 = Poor**, animals too far away (e.g. difficult to track individuals or animals are in adjacent hiding cover). Qualify the observation in the notes section.
- 4 = Unacceptable**, bad visibility due to darkness, fog, uncooperative animals.

RESULTS

Classification counts were performed to determine the total number of elk within each herd unit and classification group (Table 1). Cow counts by year, the best indicator of herd persistence (Weckerly and Francis 2004, McCullough et al. 1994) are shown in Table 2. Those data were used to determine ratios of calves/cows (Table 3), and bull/cow ratios. The ratio of calves to cows is used as an indication of herd productivity.

Table 1. Highest number of elk reported within each herd unit and for each classification grouping (with average count ; standard deviation) in 2004. MB = mature bull, SP = spike, CW = cow, CV = calf, n = total number of counts reported with ranking criteria < 3 (total survey attempts).

| Location | MB | SP | CW | CV | Total | n |
|-------------------|------------|------------|---------------|------------|---------------|---------|
| SOC | 5(4.5;0.7) | 0 | 10(10;0) | 1(1;0) | 16(15;1.4) | 2 (4) |
| Redwood Creek | 6(3.2;2.4) | 1(0.3;0.5) | 18(7.3;7.3) | 4(1.6;2) | 29(12.5;11.2) | 6 (6) |
| Bald Hills* | 3(2.1;2.1) | 2(1.8;0.5) | 71(25.8;26.9) | 3(3.8;1.8) | 82(33.8;29) | 8 (9) |
| Davison Ranch | 17(8.6;6) | 4(1.1;1.4) | 25(10.9;8.7) | 6(2.7;2.2) | 52(23.2;13.6) | 11 (11) |
| Elk Prairie | 4(1.8;1.1) | 0 | 6(4.8;0.8) | 3(1.8;1.1) | 13(8.6;2.5) | 5 (12) |
| Gold Bluffs Beach | 9(3.2;3.2) | 1(0.3;0.5) | 16(10.5;6.2) | 1(0.2;0.4) | 27(14.2;8.8) | 6 (6) |
| CBEC | No data | No data | No data | No data | 30(30.3;0.6) | 3 (N/A) |

* Only the largest count made from a single day's survey was utilized for calculations (i.e. counts of separate sub-herds made on separate days were not combined because of the possibility of double counting).

Table 2. Highest reliable (ranking <3) cow counts for identified elk herds, 1996 to 2004.

| Location | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
|--------------------|---------|---------|---------|---------|------|------|------|---------|---------|
| SOC | 11 | 16 | 14 | 13 | 13 | 9 | 8 | 11 | 10 |
| Redwood Creek | 28 | 16 | 26 | 32 | 38 | 31 | 31 | 27 | 18 |
| Bald Hills | 78 | 45 | 98 | 62 | 104 | 54 | 35 | 26 | 71 |
| Davison Ranch | 38 | 34 | 42 | 31 | 39 | 24 | 29 | 29 | 25 |
| Elk Prairie/Bypass | 25 | 21 | 21 | 15 | 20 | 19 | 9 | 5 | 6 |
| Gold Bluffs Beach | No data | 21 | 33 | 25 | 29 | 26 | 29 | 20 | 16 |
| CBEC | No data | No data | No data | No data | 16 | 0 | 23 | No data | No data |

Table 3. Calves per 100 cows for identified elk herds, 1996 to 2004.

| Location | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
|--------------------|------|------|------|------|------|------|------|------|------|
| SOC | 45 | 35 | 29 | 31 | 15 | 22 | 36 | 27 | 10 |
| Redwood Creek | 39 | 11 | 15 | 38 | 22 | 26 | 22 | 11 | 22 |
| Bald Hills | 25 | 20 | 32 | 32 | 21 | 19 | 20 | 12 | 4 |
| Davison Ranch | 23 | 27 | 18 | 23 | 41 | 29 | 21 | 21 | 24 |
| Elk Prairie/Bypass | 8 | 33 | 24 | 53 | 29 | 37 | 33 | 20 | 50 |
| Gold Bluffs Beach | N/A | 38 | 12 | 7 | 9 | 19 | 21 | 15 | 6 |
| CBEC | N/A | N/A | N/A | N/A | 13 | N/A | 22 | N/A | N/A |

Old South Operations Center (SOC) herd

The number of cows in this herd appears to have gotten smaller this year and to have produced less calves and had a lower cow/calf ratio than in previous years (Tables 2 and 3). The calf/cow ratio using the one observed calf and the highest cow count was 0.10. The bull/cow ratio was 0.5, which is considered high, even for unhunted elk. This herd

consistently maintains a very high bull/cow ratio from year to year. The highest count for the entire herd was 16.

Lower Redwood Creek herd

The elk in this herd appear to continue to utilize a long corridor of habitat along lower Redwood Creek extending from the confluence of Prairie and Redwood Creeks upstream to the confluence of Cloquet and Redwood Creeks. Elk herds have been seen even farther upstream in previous years, but these sightings may or may not be a separate herd. The size of the herd was smaller than in previous years. Cow counts were the second lowest since monitoring began in 1996 and were significantly lower than the previous six years' counts (Table 2). The calf/cow ratio was 0.22 and was also lower than in previous years (Table 3). The bull/cow ratio was 0.33. The highest count for the entire herd was 29.

Bald Hills herd

Elk groups in the Bald Hills continue to appear to be comprised of several discrete herds which have been observed near Ganns Prairie, Elk Camp, Airstrip, Childs Hill, Schoolhouse Peak and Maneze Prairies as well as the Coyote Creek and the Williams Ridge areas. Unlike some previous years when large aggregate herds were seen only during the non-breeding season, this year's classification counts included observations of comparatively large herds seen together during the rut. The cow count was comparable to other high count years (Table 2). The calf/cow ratio for this herd was 0.04 and the bull/cow ratio was 0.04, extremely low when compared to previous years (Table 3).

Davison Ranch (Elk Meadow) / Berry Glen herd

Like the old SOC herd, this elk herd is one of the most visible and easily accessible herds in the park. Classification counts were typically conducted under good visibility and the animals were often close enough to observe with a high confidence in accuracy. The herd continues to consist of a group of mature bulls that occupy the northern portion of Elk Meadow north to the Lost Man Creek Hatchery, and a separate group of cows, spikes, and calves that occupied the southern portion of Elk Meadow south to Skunk Cabbage Creek. The highest total count was 52, and the calf/cow ratio was 0.24. The bull/cow ratio was 0.68, with 17 mature bulls observed during one of the counts. These numbers are similar to all previous years' counts with a general upward trend in the number of bulls, downward trend in the number of cows (Table 2) and relatively stable productivity (Table 3).

Elk Prairie / 101 Bypass herd

Like the last two years, but unlike all previous survey years, this herd was extremely difficult to gain accurate counts of or even find and this is reflected in the small number of successful counts (5) compared to the number of survey attempts (12). Surveyors made repeated efforts to find this herd but were unsuccessful on most occasions. It appears that the herd has possibly changed their primary grazing range to the Highway 101 Bypass area and away from Elk Prairie or has actually declined in number. There are a number of spots along the Bypass which are hidden from the highway itself or are unsafe to stop to survey. It is possible that the larger numbers seen in previous survey years still exist in this herd but were simply not seen this year. In addition, it appears that Elk Prairie is now only being used by one small family group, as evidenced by the identical classification counts made this year, indicating that the same herd was being counted repeatedly. The highest cow count for this herd was 6, a significant drop compared to years previous to 2002 but a slight increase over the past two years (Table 2). The calf/cow ratio was a relatively high 0.5 (Table 3), but was probably an artifact of the small size of the herd (i.e. one more or one less calf would significantly alter the cow/calf ratio in such a small herd). The extremely high bull/cow ratio of 0.67 was also probably an artifact of the small herd size.

Gold Bluff Beach herd

Similar to the Bald Hills herd, the Gold Bluffs Beach herd seems to be comprised of several discrete sub-herds which have been observed from just south of Mussel Point to just north of Carruther's Cove. As with previous years, the most consistent sightings of a large herd occurred near the Ossagon Rocks. The highest number of cows observed in this herd was 16, the lowest cow count ever recorded for this herd (Table 2). The calf/cow ratio was 0.06 and was similar to the low count years of 1999 and 2000 (Table 3). The bull/cow ratio was 0.56, an increase compared to previous years. Small groups (<5) of elk or elk tracks were sometimes observed south of Major Creek and Mussel Point during plover and beach carcass surveys while small family groups and bachelor male groups continue to be consistently seen near the campground, Boat Creek mouth/marsh near the Fern Canyon parking lot and at the mouth of Espa Creek.

Crescent Beach Education Center (CBEC) herd

Fish and Wildlife staff did not survey the CBEC herd. However, some RNSP staff members stationed at CBEC did record elk in the meadows near CBEC when they observed them on an *ad libitum* basis. Unfortunately, the herd was not classified by sex and age again this year so no ratios can be reported. Attempts will be made to supply staff at CBEC with training and data forms for 2005. Employee turnover was the reason for the lack of data collected this year. The overall herd size in 2004 was consistent with the past two year's observations. There is some speculation that this herd may be the same herd seen occasionally at the Aubell facility approximately 2.5 miles to the north or

that this herd mingles with the elk herd seen near the former mill site on Mill Creek in the California Department of Parks and Recreation (CDPR) acquisition area, approximately 2 miles to the east.

Other

Opportunistic visitor and staff observations were scarce this year, unlike previous years. All elk reported by visitors were from the herds described above. The one notable exception was an observation made by me of a herd of approximately 23 cows and 3 bull elk on Hamilton Road at the mill site in the CDPR Mill Creek Acquisition property. Casual conversations with CDPR staff working on the property indicate that the herd commonly frequents the mill area on the west side of Mill Creek and all along Picnic Road along the west branch of Mill Creek. The parks have no records of how many elk occupy this area and further surveys are needed to determine the distribution and relative size of the herd(s) foraging here.

DISCUSSION

Harper et al (1985) reported that calf/cow ratios for Roosevelt elk in Oregon average 0.39 (range = 0.32 to 0.47). The Oregon estimates were from herd units that were subject to hunting mortality. In a late 1970's RNSP study, Mandel and Kitchen (1979) reported the approximate calf/cow ratio at 0.20. The calf /cow ratios reported for the identified elk herds within RNSP during 2004 ranged widely from 0.04 –0.5, with 3 herds below 0.20. It is difficult to make meaningful comparisons of calf/cow ratios per herd from year to year, however, due to the variability in sampling. Many herds are often difficult to observe which results in low numbers of sample counts which in turn may mean that current ratios do not accurately reflect real changes in calf production. Alternately, some herds may become easier to observe, as was evidenced by the Bald Hills herd this year. Interestingly, despite seeing relatively high numbers of elk in the Coyote Creek basin portion of the Bald Hills in 2004, and thus assumedly a greater proportion of the total population in the area getting recorded, the cow/calf ratio was comparatively very low. However, even some high visibility herds, like the old SOC group, had very low calf production this year. Overall, however, productivity appeared to be similar to previous years as measured by cow/calf ratios, with some herds increasing in productivity and some herds decreasing.

The trend in total cow numbers, however, appears to be indicating a general decline. The trend is only slight and has only been apparent for the past two years. Future monitoring should help to indicate whether this trend is merely a temporary fluctuation or an actual, and permanent, decline.

A recent draft report on elk studies in RNSP by Weckerly and Francis (2004) is very useful for comparison and analysis. Of particular interest is the section of the report on the authors' surveys of the Elk Prairie and Davison herds as well as the sections on the effectiveness of various survey techniques utilized to count the Bald Hills herd. The

authors started conducting counts of the Elk Prairie and Davison herds in 1996, the same year RNSP staff initiated an annual elk monitoring program. Weckerly and Francis's cow counts of the Elk Prairie and Davison herds closely match the park's counts. Due to the independence of the two monitoring programs, it is highly likely that the decline seen in the Elk Prairie herd is an actual decline and not a sampling error (Weckerly and Francis 2004). The two monitoring programs, however, do differ significantly in their age and sex class ratios. Weckerly and Francis (2004) attributed the differences in age class ratios to observer variation and difference in areas surveyed for sex class ratios. They suggested that at least ten counts be made by two independent observers to decrease the sex class ratio variability. They did not think that the sex class ratio differences can be corrected because the habitat use patterns typical of bull elk in RNSP precludes accurate counts (i.e. bull elk utilize forested areas much more than the more easily observed meadow cows of these two herds) (Weckerly 1996).

Weckerly and Francis (2004) also attempted to count the Bald Hills herd using two different survey techniques. The first technique relied on scat transects and proved to not be a viable monitoring method. The second method involved direct observation similar to the park's technique described in this report. Using "boot strapping" statistical analysis, the authors determined that at least ten counts need to be made to accurately determine the size of the Bald Hills herd. RNSP staff made eight counts in 2004 but counted over 150 fewer elk than these authors did in 2003. The highest park count ever made of the Bald Hills herd is still almost 100 fewer elk than these authors' 2003 count of 248 individuals. This large discrepancy may not only be due to sampling error. Weckerly and Francis conducted their counts in January and February whereas all RNSP counts conducted since 1996 have been done between October and December. The elk herd in the Bald Hills of RNSP appears to fission during the fall and use forested habitats more often in the winter (pers. obs.). The cause of this apparent grouping and habitat use change is unknown but may be attributable to socio-behavioral shifts caused but the rutting season, the fall hunting season on adjacent private timber lands and/or seasonal changes in climate and food sources. Regardless, it may be useful for future RNSP Bald Hills elk classification counts to be conducted in January and February when this herd appears to congregate in larger subherds out in the open. It should be noted, however, that age classification of calves will be much more difficult at this time of year because calves would be approaching the size of females, making accurate age class determinations difficult.

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